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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/869,783	06/29/2001	Kazutoshi Kaji	1743/188	8575

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EXAMINER

JOHNSTON, PHILLIP A

ART UNIT PAPER NUMBER

2881

DATE MAILED: 02/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/869,783

Applicant(s)

KAJI ET AL.

Examiner

Phillip A Johnston

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

D tailed Action

Claims Rejection – 35 U.S.C. 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taniguchi (823), in view of Krivanek (255).

Taniguchi (823) discloses a unit and method of observing an element map or distribution by using a transmission electron microscope equipped with an energy filter. The unit includes an electron beam emitted from an electron gun 2 is accelerated under the effect of a high voltage generated by a high-pressure tank 16 to be projected onto a specimen 4 by means of an irradiating electron lens system 3. A major part of the electron beam or electrons transmit through the specimen 4 without losing energy. However, those electrons which undergo energy loss in dependence on elements

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constituting the specimen 4 due to inelastic scattering are spectrally filtered by an energy filter 6 after passing through an image forming electron lens system 5, as a result of which an energy spectrum is generated on an energy selecting slit 17. By making adjustment of the transmission electron microscope 1 such that only the zero-loss electrons can pass through the energy selecting slit 17, a zero-loss image formed by a final image forming electron lens system 7 can be observed with the aid of an image pickup device 8 such as a television camera. When the acceleration voltage is increased ΔS , by means of an acceleration voltage control unit 13, those electrons, which have undergone energy loss by ΔE in the specimen 4 can pass through the energy selecting slit 17 after having been spectrally filtered by the energy filter 6. Thus, an energy-filtered image formed by those electrons having lost energy by ΔE can be observed through the medium of the image pickup device 8. The individual frames of the energy-filtered images resulting from the separation are sequentially stored in a plurality of frame memories 11a, 11b on a frame-by-frame basis. The frame memory selector 10 is so arranged as to select one frame from plural frame memories 11a, 11b periodically by using a synchronizing signal to thereby store the energy-filtered image. Further, the frame memory selector 10 is also adapted to control the acceleration voltage control unit 13 so that the acceleration voltage is incremented by ΔE_1 for selecting the frame memory 11a while incrementing the acceleration voltage by ΔE_2 upon selection of the frame memory 11b. As a consequence, a filtered image of electrons having lost energy by ΔE_1 is inputted to the frame memory 11a, while a filtered image of electrons undergone energy loss by ΔE_2 is inputted to the frame

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memory 11b. In addition, an arithmetic image processing unit 14 compares the images of the frame memories 11a and 11b with each other through arithmetic processing, the results of which are successively outputted to a monitor 15. The arithmetic processing executed by the arithmetic image processing unit 14 is either an inter-image subtraction processing or an inter-image division processing. An intensity regulation unit (also referred to as amplitude regulation unit) 12 is a mechanism for attenuating the intensity of the energy-filtered image inputted to the frame memory 11b uniformly with a predetermined ratio. The inter-image division processing of unit 14 produces the distribution or map of the elements constituting the specimen as shown in Figures 6A-6D. See Column 6, line 21-67, Column 7, line 1-24, and Figures 6A-6D.

Taniguchi (823) further discloses that, an attenuation constant by which the picture signal stored in the frame memory 11b is to be multiplied is determined by using the intensity regulation unit 12 so that the contrast mentioned above disappears. Owing to this processing, changes of the background as brought about due to the difference in the energy level can be corrected or canceled out, as recited in Claim 3. See Column 8, line 6-12.

Taniguchi (823) also teaches that this map can be produced by selecting energy-filtered images obtained by providing an energy window at a region immediately preceding to the core-loss energy region for thereby suppressing influence of a core-loss current. The pictures are inputted into a computer through the medium of an image pickup device 8. By making use of such characteristic that in a region containing no element of interest, intensity of one picture decreases uniformly relative

to the intensity of the other picture, whereas in a region containing elements of interest, the intensity of the former changes in dependence on density or concentration of elements of concern, the intensity ratio between the pictures stored in the two frame memories is derived on a pixel-by-pixel basis as a video or picture signal to thereby allow the intensity ratio between the plural energy filter images of different energies to be displayed as a function of time lapse. See Column 10, line 55-67, and Column 11, line 1-5.

Taniguchi (823) as applied above does not disclose the use of a detector that contains multiple electron beam detecting sections. Krivanek (255); however, discloses a preferred parallel detector 15 which contains a large number of independent detection channels, each of which is elongated in the direction perpendicular to the direction of the energy dispersion so as to relax the requirements for precise focusing of the electron beam in that direction. The preferred orientation of the deflector 12 is such that the direction of the deflection is perpendicular to the dispersion direction, so that while the electron beam is swept across the active area of the detector, electrons of a particular energy are always incident on one and the same detector element. See Column 4, line 23-33.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, that the Taniguchi (823) STEM could be modified with the detector of Krivanek (255), to provide increased detector resolution, if so desired.

Taniguchi (823) further teaches that electrons having transmitted through a specimen lose energy due to inelastic scattering, as exemplified by plasmon loss and

core loss, to exhibit an energy spectrum, as recited in Claim 6. The core-loss energy is a quantity inherent to elements constituting the specimen.

Taniguchi (823) as applied above does not disclose detection of a plasmon energy loss spectrum. Krivanek (255); however, discloses in Figure 6, an electron energy-loss spectra acquired from a thin specimen of boron nitride with the apparatus of the Krivanek (255) invention at a total electron beam current of about 1 nA, which is typical for electron energy-loss spectroscopy carried out in a transmission electron microscope. Spectrum 61 of FIG. 6 was acquired with the attenuator switched off, in the shortest possible detector cycle time, as determined by the read-out electronics associated with a 1024-channel linear photodiode array used as the parallel detector. The zero loss peak and the intense feature of 23 eV energy loss (the first plasmon) in the spectrum both exceeded the saturation threshold level 62 of the detector.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, that the Taniguchi (823) element mapping unit and method could be used in accordance with the teaching of Krivanek (255) to detect and store the plasmon energy spectra, if so desired.

Conclusion

3. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (703) 305-7022. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to


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reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (703) 308-4116. The fax phone numbers are (703) 872-9318 for regular response activity, and (703) 872-9319 for after-final responses. In addition the customer service fax number is (703) 872- 9317.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

PJ

January 28, 2003


JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800